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To: Dr. G. E. Inskeep

RECEIVED Date: September 16, 1976

From: N. B. Rainer

SEP 16 1976 FILE

Subject: PM #626 - Smoking Material and Method for Its Preparation

G. E. INSKEEP

I have reviewed the Office Action of August 19, 1976 in the above-identified patent application.

References:

U.S. 3,545,448 to Morman, et al. concerns a tobacco replacement material produced by the catalytic thermal degradation of carbohydrate material. The resultant product is black and nonfilm-forming. There is no mention of oxidation of the carbohydrate.

U.S. 3,459,195 to Silberman discloses the use of oxidized cellulose in a smoking composition. The oxidized cellulose is prepared by treatment of cellulose with NO_2. There is no disclosure or suggestion of the use of any oxidized carbohydrate in the form of a film. Although NO_2 treatment of a carbohydrate may be said to be similar to O_3 treatment of a carbohydrate insofar as both gases can produce carboxyl groups, the differences are significant. For example, as disclosed by Silberman in Column 3 Lines 60-64, the NO_2-treated cellulose contained appreciable amounts of chemically bound nitrogen. The combined nitrogen can produce not only off tastes in the smoke but potentially harmful compounds. There is no disclosure by Silberman of the use of ozone to produce the desired modified cellulose.

U.S. 3,516,416 to Briskin et al. relates to the oxidation of cellulose with liquid NO_2 to produce a smoking product. There is no mention of ozone or smoking products in film form. In Column 1 Lines 47-69, there is some discussion of the subsequent purification methods required in order to make an NO_2-oxidized cellulose an acceptable smoking product. Such subsequent purification steps are not required in applicants' invention. In fact, such purification steps could not be utilized with applicants' soluble carbohydrate because said carbohydrate would dissolve in the treating solution and no separation of impurities could be achieved.

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U.S. 3,478,752 to Briskin, et al. relates to the oxidation of cellulose with NO_2 and oxygen. There is no mention of ozone. The oxygen serves several purposes, one of which is enhancement of the desired selective oxidation (Column 4, Line 41). It should be noted that the NO_2 reaction is considered to be of value primarily because it is selective in forming carboxyl groups in the cellulose without causing degradation of the cellulose chain structure (Column 3, Lines 20-26 and elsewhere in Briskin). By way of contrast, the function of ozone in applicants' invention is to achieve degradation of the cellulose chain structure (see first paragraph, p. 15 of applicants' disclosure). These are two completely opposite objectives.

U.S. 3,577,994 to Keller is very similar to the Briskin references insofar as it is concerned solely with the reaction of NO_2 with cellulose.

U.S. 1,957,937 to Campbell relates to the bleaching of fibrous cellulose materials with chlorine to obtain whiter papers. Although ozone is mentioned in Column 2 Line 8, it is mentioned only as an optional after-treatment.

U.S. 2,438,100 to Whitner concerns the bleaching of cellulosic textile fibers with ozone and an alkylolamine.

U.S. 2,232,990 to Yackel, et al. relates to the preparation of undegraded alkali soluble oxidized cellulose by treatment with NO_2 below 20°C.

U.S. 1,760,042 to Crespi, et al. discloses the bleaching of textile fibers with ozone under conditions which produce no degradation.

U.S. 3,897,792 to Yasui, et al. concerns the production of a smoking product by degrading cellulose via treatment with alkali and oxygen. No mention is made of the use of ozone or of the formation of carboxyl groups on the cellulose. The degraded product is still insoluble in water and not a film-former. Although films are mentioned, they are made by mixing the treated cellulose in pulp form with a water-soluble binder and casting the mixture.

U.S. 3,720,660 to Arendt, et al. discloses the production of a smoking product by oxidizing a polysaccharide with nitrosonium ion. The product contains carboxyl groups but has undergone a low degree of degradation of the polysaccharide molecule (Column 1, Lines 51-53). There is no disclosure of film-forming characteristics.

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Britain 727,771 concerns a method for bleaching textile material with ozone.

Agriculture Handbook No. 98 makes no mention of the oxidative treatment of pectin or the use of pectin as a smoking product.

Comments:

The present invention (as elected by the attorney) concerns a process for preparing a smoking material. The following features are important:

1. The starting material is a film-forming carbohydrate.
2. It is treated with ozone.
3. The treatment produces at least 0.2 meq. of CO_2H groups/gram of carbohydrate material.
4. The treatment causes a reduction in the molecular weight of the carbohydrate.
5. The treated material is converted into a film which is comminuted into a form suitable as a tobacco substitute.
6. The treated product has improved smoking characteristics.

Not a single one of the cited references disclose or suggest all five features enumerated above. The Examiner has cited references from diverse fields of art, some of which are highly remote to one skilled in the art of smoking products. Even by combining four or five references, each illustrating a single feature in isolation, the Examiner still has not assembled all the important features of applicants' invention. The combining of the references is tantamount to reconstructing the present invention with the information provided by the applicants. Such an approach would not be available to or obvious to one possessing ordinary skill in the art of smoking materials.

NBR:jl

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